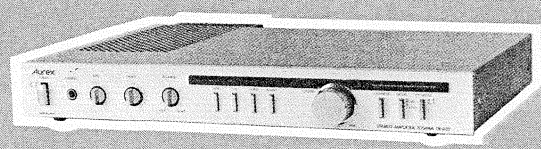
SERVICE DATA
FILE NO. 170-115

TOSHIBA

STEREO AMPLIFIER

SB-A70



SPECIFICATIONS

■ General

Power supply:	220V – 50 Hz for Europe or 240V – 50 Hz for the United Kingdom and Australia
Power consumption:	320W
Weight:	5.6 kg
Dimensions:	420(W) x 58.5(H) x 320(D)mm

■ Amplifier

Continuous power output 20 Hz ∿ 20 kHz both ch. driven:	50W x 2 (4Ω), 50W x 2 (8Ω)
1 kHz both ch. driven:	55W x 2 (4Ω), 60W x 2 (8Ω)
Total harmonic distorsion:	0.015% (at rated power 8Ω)
Frequency response:	5 Hz ∿ 100 kHz $(^{+0\ dB}_{-3})$
Power band width (IHF):	10 Hz ∿ 35 kHz
Load impedance:	8Ω: 8Ω ∿ 16Ω 4Ω: 4Ω ∿ 8Ω
Damping factor:	25
S/N (IHF A Network):	100 dB (TUNER/AUX) 72 dB (PHONO)
Input sensitivity/-impedance:	PHONO 2.5mV/47KΩ TUNER 150mV/47KΩ AUX/TAPE 150mV/47KΩ MIC 1.0mV/47KΩ
Output level:	TAPE REC 150mV
Tone control:	BASS (at 100 Hz) ±8 dB TREBLE (at 10 kHz) ±8 dB
Phono overload level:	130mV (RMS)

Specifications are subject to change without notice.

TE, TU

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1. OPERATING CONTROLS

Function indicators
These LED lamps light up to indicate which function button 8 has been pressed.

Phones
Plug into-this jack when listening through headphones.

Power switch
Depress this switch to turn on power, depress again to turn power off.

FRONT VIEW

Tone controls
Turn these knobs clockwise from the centre zero (flat) position to emphasize bass or treble tones. Turn counter-clockwise to attenuate (decrease) bass or treble tones.

Balance control
Turn this knob to adjust volume balance between left and right speakers.

Function selector
TAPE: For listening to tapes (use only for tape playback since this switch is not a tape monitor switch)
AUX: For use with any kind of audio equipment (excluding turntables and microphones)
TUNER: For listening to radio broadcasts.
PHONO: For listening to records on the turntable

Volume
Turn this knob to adjust the volume level.

Peak power meter
This meter indicates the peak (instantaneous) power output level when using 8 ohm speakers. For 4 ohm speakers, multiply the indicated readings by 2 to obtain approximate values. The meter indicates the power output level of whichever channel is producing the higher output.

Speaker selector
A: Sound from speakers connected to rear pannel terminals A
B: Sound from speakers connected to rear panel terminals B
Use this selector to select either A or B. Simultaneous use of both sets of speakers is not possible.

Mode switch
Depress this switch to mono setting for monaural reproduction when the input signal is monaural of to convert stereo input signal to monaural form. Otherwise keep this switch in stereo setting.

Loudness switch
Turn this switch on when listening at very low volume levels to emphasize the low-and high-frequency regions (this switch is effective between MIN and 12 o'clock position of the volume knob)

Figure 1

2. SYSTEM CONNECTIONS

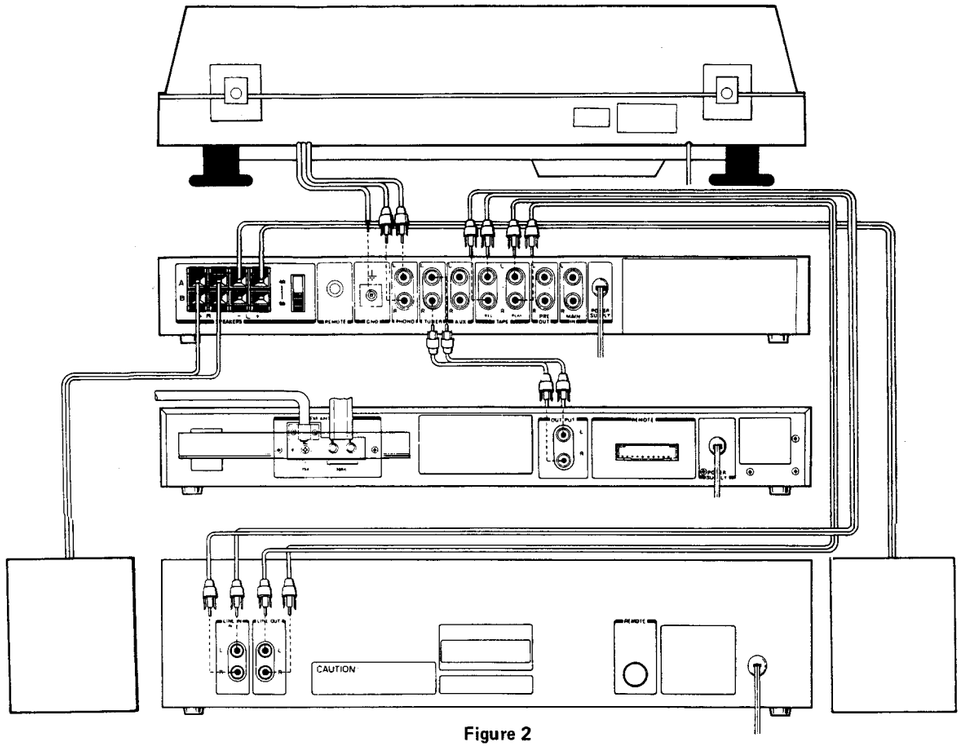


Figure 2

CAUTION

To remove the two screws at the same time is hard to installate. So reinstallate the screw from the cover again, then remove another screw.

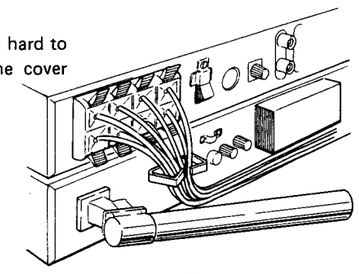
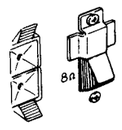


Figure 4



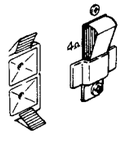


Figure 3

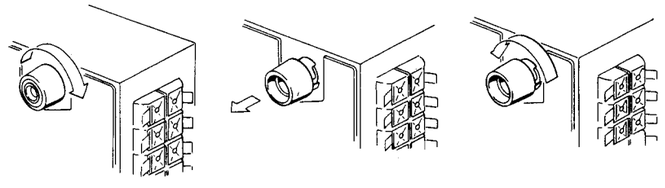


Figure 5

3. OPERATION

Note: Until all connections have been properly completed, leave the power supply cords unplugged and the power switches OFF.

- **Connection of speakers to the amplifier**

Connect the right speaker cord to the "R" amplifier speaker output terminal and the left speaker cord to the "L" terminal. Be sure to connect the plus terminal of the speaker to the plus terminal of the amplifier speaker output terminal and minus to minus. Wrong connection of plus and minus results in loss of stereophonic playback sound.

* Be sure to leave the power switch of the amplifier OFF while performing connections.
* Do not short-circuit the plus and minus terminals of the speakers.

Note: When using a pair of speakers, use only those with proper impedance to avoid overloading the amplifier.

* Confirm that the volume knob is in the MIN position before the power is turned ON.

- **To select function**

When the power switch ① is turned on, the function selector is automatically set to tuner setting. If another function is desired, depress the function selector to relevant setting.

- **To play phonograph records**

Connect the output cables from the turntable to the PHONO terminals of the amplifier. If the turntable is equipped with an earth wire of terminal, be sure to connect it to the earth wire terminal (GND) of the amplifier. If this simple task is overlooked, it may result in the generation of a hum.

- **To listen to radio broadcasts**

Connect the tuner output cables to the TUNER input terminals on the rear panel of the amplifier.
There is no special need to link the tuner and amplifier with an earth wire.

- **To use the AUX terminals**

When an audio component is connected to the AUX terminals, turn the function selector to AUX setting. Operate the connected component according to its instruction manual. Finally, adjust the volume and tone as desired.

- **Tape deck connections**

Connect the tape deck input terminals (LINE IN) to the amplifier's record terminals (REC), and the deck output terminals (LINE OUT) to the amplifier's playback (PLAY) terminals.

(1) To record

Prepare the programme source (turntable, tuner or any other audio programme source) to be recorded, and set the tape deck in the recording mode. Note that during actual recording, the amplifier volume and tone controls will have no effect on the recording level or tone.

(2) To play

To listen to a pre-recorded tape, depress the function selector 8 TAPE button and turn on the connected tape deck for playback. Since this is not a tape monitor switch, do not depress TAPE button during recording with the connected tape deck. If the TAPE selector is depressed during recording, it may result in failure of recording output power.

- **To adjust the height of feet**

The feet on the bottom panel are adjustable in height for high power output use. The amplifier radiates a significant amount of heat when used at high power output for a long time. In that case, the feet can be extended for 7mm. (Fig. 5)
To extend the feet:
1. Turn clockwise
2. Pull lightly along the axis
3. Turn counterclockwise till each is locked

When using this amplifier with ST-S70 and PC-E70, the vertical space between each component can be set to the same 8.5 mm by extending the feet, -- all components' heights thus become the same.

- **Speaker impedance selector (Rear panel)**

This selector is set in relevant position according to the chart below when shipped. It may cause overheating when using speakers of less than 8 ohm rating are used with this selector in 8 ohm position (especially those of U.K. and Australia models). If the desired speakers are of different impedance from the chart below, consult with dealer. (Fig. 3)

Area	Selector	Usable speaker	Power supply
Europe	4 ohm	4 ohm or more	AC 220V
The U.K. and Australia	8 ohm	8 ohm or more	AC 240V

- **Connection between PRE OUT and MAIN IN terminals**

When not using the RM-70 remote control unit, always connect PRE OUT (L) to MAIN IN (L), and PRE OUT (R) to MAIN IN (R) with the short-circuit pins provided. Do not connect R and L terminals of PRE OUT together, or R and L terminals of MAIN IN together. Unless all connections are properly completed, there may be no sound output, or only one channel may be heard.

- **Placement**

Since this amplifier uses some parts containing fluid, place this unit at a level. If the unit is inclined over 15° it may cause overheating.

- **Speaker cords**

After speaker connections are completed, bundle them with binder attached to the ST-S70 according to the Figure 2. If the cords come near the AM aerial of the tuner, they may affect AM reception badly. (Fig. 4)

● **Heat dissipation**

When stacking this amplifier with other equipment, always be sure to place this unit at the top. Because the amplifier radiates a significant amount of heat when driven at high power output, do not cover the ventilation openings.

● **Remote control operation**

Remote control operation is possible by use of the external RM-70 remote control unit.

Remote control operations include: ON and OFF power switching. TAPE/AUX/TUNER/PHONO function switching and volume control.

4. DISASSEMBLY INSTRUCTIONS

REMOVAL OF TOP COVER

1. Remove four screws ① (3ϕ x 6mm) from both sides of top cover as shown in Figure 6.

REMOVAL OF FRONT PANEL

1. Remove top cover as shown in Figure 6.
2. Remove three screws ② (3ϕ x 8mm) holding front panel and back plate as shown in Figure 7.
3. Remove three screws ③ (3ϕ x 8mm) holding front panel and bottom plate, then front panel can be removed as shown in Figure 8.

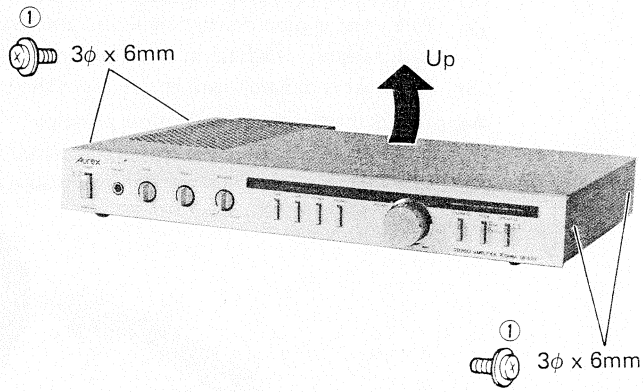


Figure 6

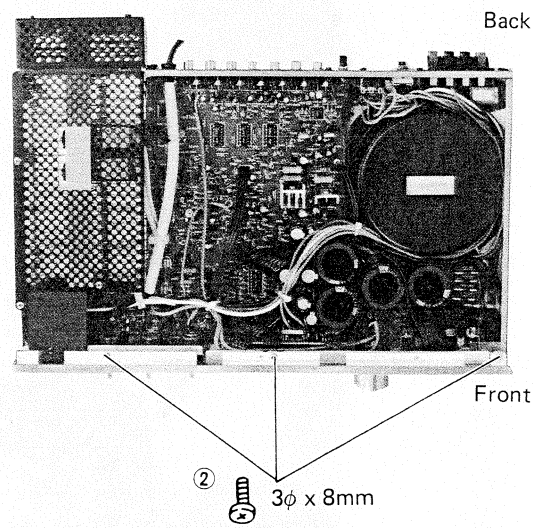


Figure 7

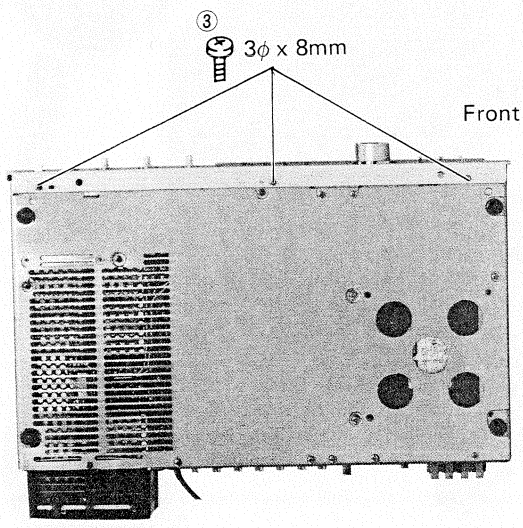


Figure 8

5. TECHNICAL INSTRUCTIONS

[1] Don't incline the equipment when using it.

If the equipment is inclined, the radiator efficiency lowers and the junction temperature of the output transistor lowers, causing a fault. The reason is explained below.

(1) Principle of the heat pipe

A newly designed part called a heat pipe is used as a radiator of the last stage transistor of the amplifier. The heat pipe is basically composed of three parts as shown in Figure 9.

(1) A fixture to conduct the heat of the transistor to an enclosed copper pipe

(2) The copper pipe containing liquid and kept vacuous absorbs the transistor heat as heat of vaporization, and transmits the heat in all directions at the rate as fast as the sound speed.

(3) The heat is radiated into the air from the blade provided at an appropriate position of the cabinet.

According to the above operation principle, the transistor heat is transmitted to the part with the high radiation efficiency (blade) at the rate as fast as the sound speed. Therefore, the high radiation efficiency can be obtained without generating noticeable temperature difference in the radiator.

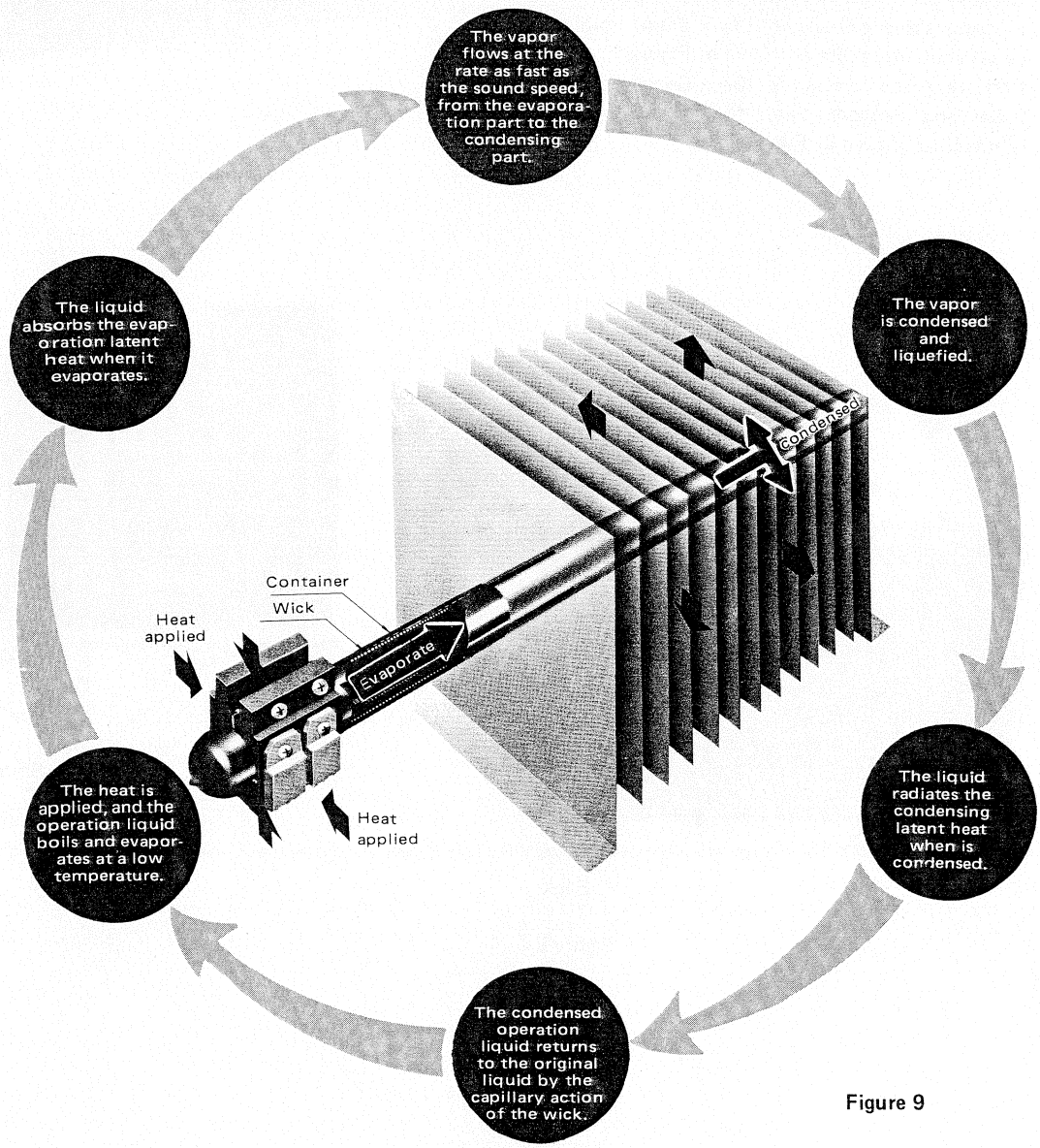

The vapor flows at the rate as fast as the sound speed, from the evaporation part to the condensing part.
The vapor is condensed and liquefied.
The liquid radiates the condensing latent heat when is condensed.
The condensed operation liquid returns to the original liquid by the capillary action of the wick.
The heat is applied, and the operation liquid boils and evaporates at a low temperature.
The liquid absorbs the evaporation latent heat when it evaporates.
Condensed
Container
Wick
Heat applied
Evaporate
Heat applied

Figure 9

(2) Position of the heat pipe

The heat pipe is located on the left side within the cabinet and set so that the pipe becomes horizontal from the front side toward the depth of the cabinet.

With this setting, the liquid contained in the pipe adheres evenly to the inner wall of the pipe and evaporates immediately after the transistor is heated.

If the pipe is inclined, the liquid stays at one end of the tipe, making evaporation difficult.

(3) Inclination and temperature

See Fig. 10. When the transistor junction temperature Tj Max. set at 123° C,the equipment can be used with the inclination of 15° maximum. If the equipment is inclined so that the heat pipe is kept horizontal (e.g., in the lateral direction), there is no problem.

(4) Repetition of freezing

There is no problem as long as the heat pipe is set in the equipment. When the heat pipe is stored as a part and freezed/defrosted repeatedly with the pipe inclined, the liquid expands and may damage the pipe. Therefore, be sure to store the heat pipe on a horizontal place.

[2] 4Ω/8Ω selector switch

Avoid using a speaker of 4Ω in England. If it is used, set the selector switch to the 4Ω position on the rear panel. Mis-matching of the switch position to the impedance of the speaker to be used will cause the following troubles.

	Connect a speaker 4Ω	Connect a speaker 8Ω
Switch position 4Ω	OK	Lowered output
Switch position 8Ω	Overheat	OK

(1) 4Ω/8Ω selector switch circuit

See Fig. 12. The impedance is changed over to the high voltage side of the secondary side of the power transformer at the 8Ω position, and the low voltage side at the 4Ω position, so that the same output is obtained.

The voltage/current characteristic is shown in Fig. 11. When the power of 6.25W x 2 is supplied to the speaker with the switch set to the 8 Ω position (A in Fig.11),for example,the power of ±41.5V 0.78A or 64.7 watt is supplied from the power supply circuit to the amplifier.

Therefore: P_1 41.5 x 2 x 0.78 = 64.7 watt Power consumption of the amplifier

P_2 64.7 – 6.25 x 2 = 52.2 watt Power changed to heat in the amplifier

(To speaker output)

(2) Mis-connection

When a speaker of 4Ω is connected with the switch set to the 8Ω position, a current of 1.25A flows in the amplifier when the power of 6.25W x 2 is obtained.

The voltage is ±40V at that time.

Therefore: $P_1' = 40 \times 2 \times 1.25 = 100$ watt

$P_2' = 100 - 6.25 \times 2 = 87.5$ watt

As a result:

Heat loss as much as $P_2' - P_2 = 35.3$ watt occurs, the temperature increase is considerable, and the power is wasted. When a speaker of 8Ω is connected with the switch set to the 4Ω position, the collector voltage lacks and a distortion is increased, and the maximum output lowers.

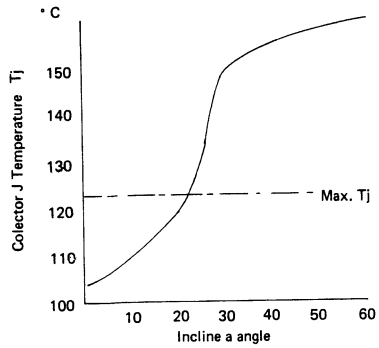


Figure 10

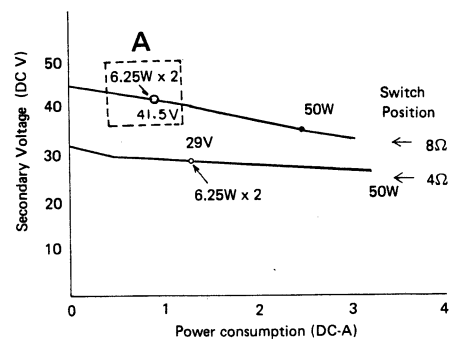


Figure 11

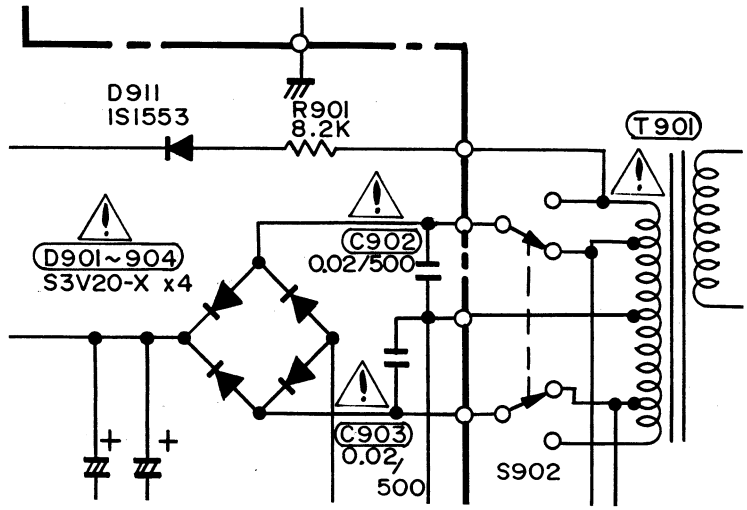


Figure 12

[3] Rack mounting

When the equipment is mounted on the rack, take space of at least 40mm above the equipment and 20mm on the left side. Avoid mounting at a narrow place close to a wall.

(1) Temperature when the equipment is enclosed

See Fig. 13. The temperature is lower than the design standard, Tj max. 125° C under the condition of B $\geqq$20 mm and A $\geqq$40 mm.

The temperature lowers further if the backside of the rack is opened or a slit is provided.

(2) To lower the temperature

Since the cabinet is slim and 50 mm in height, there are fewer place to escape the heated air as compared with the cabinet of 100 mm in height, and the cabinet is easily influenced by external conditions.

A radiator is provided on the left side of the cabinet. Therefore, set the equipment away from a wall. The tuner has radiation holes to increase the radiation effect.

The foot length is variable. It is recommendable to extend the foot to its full length if there is no problems. This lowers the equipment temperature.

Remarks: This paragraph is added unlike the description of the conventional equipment, but it never means the lowered design standard of this equipment. The equipment is designed at the same level as that of the conventional one. This paragraph is added in order to have a close relationship between the user and factory to provide the user with detailed information. For this purpose, the data of the manufacturer's side is given in this paragraph.

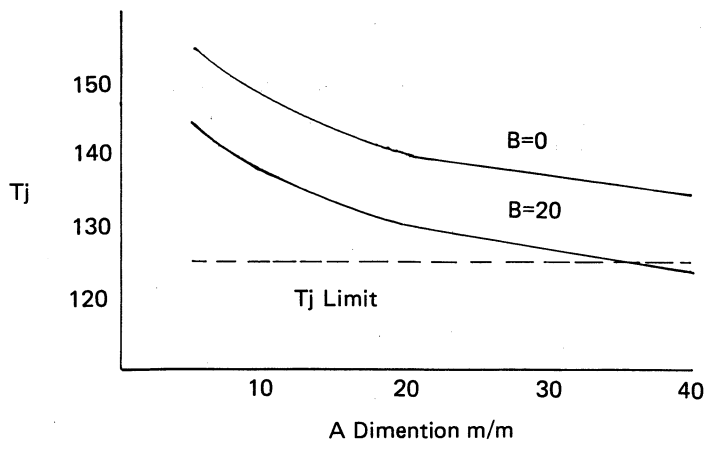


Figure 13

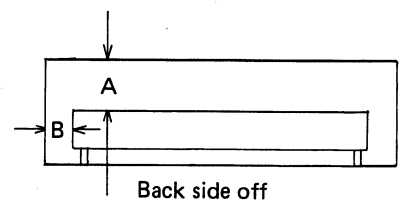


Figure 14

6. ADJUSTMENTS

IDLE CURRENT ADJUSTMENT

1. Idle current adjustment can easily be done by setting the semi-fixed VR R637, 638 (100 ohm) to mechanical mid point VR as shown in Figure 15.
2. The idle current between TP and TP must be less than 6mA when power has been on for 30 seconds.

LED LEVEL ADJUSTMENT

1. Right channel is fixed.
2. Only left channel can be varied. Adjust semi-fixed VR R707 (5K ohm) so that the LED lighting level of right channel is equal to that of left channel.

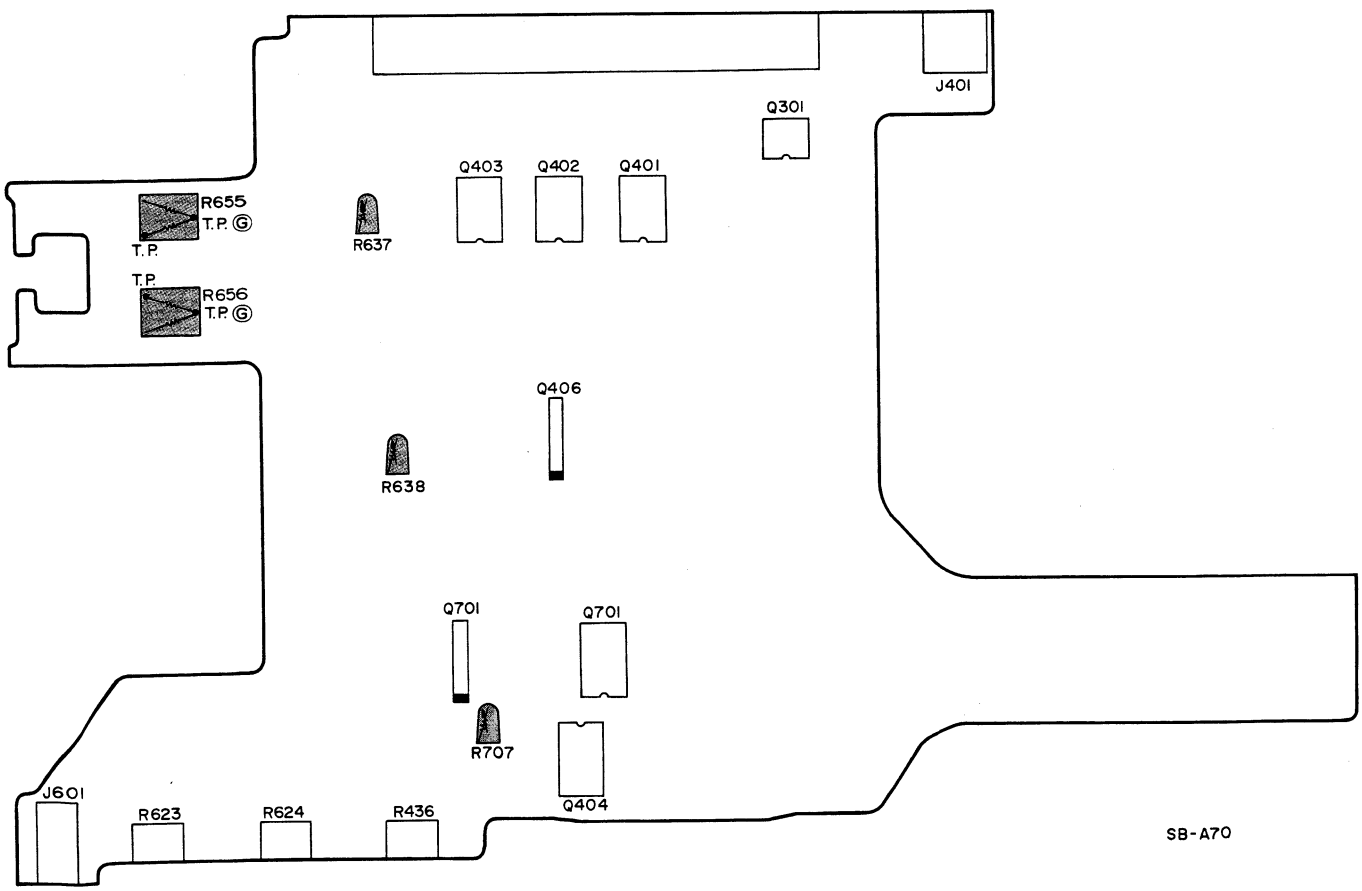


Figure 15

7. BLOCK DIAGRAM

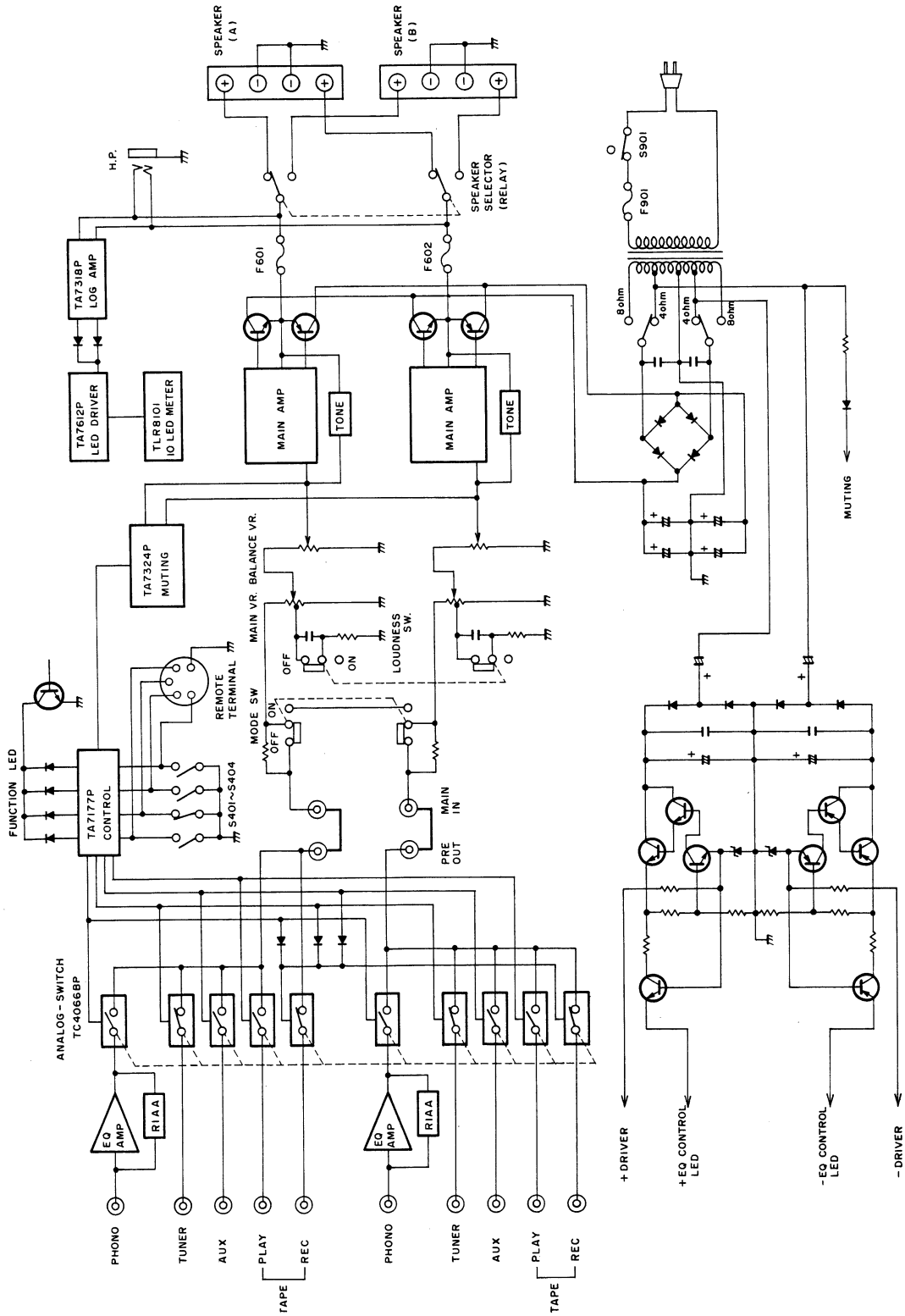
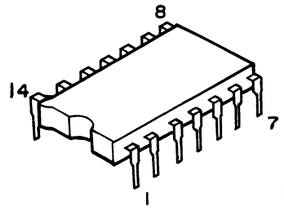


Figure 16

8.IC BLOCK DIAGRAM



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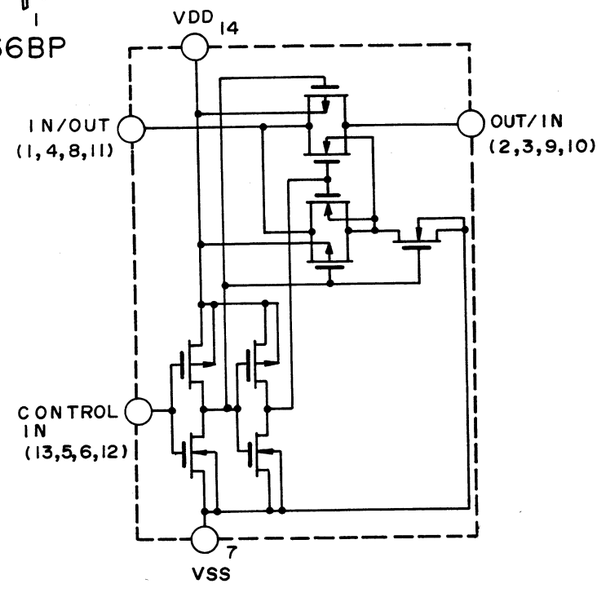

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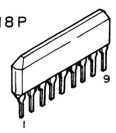

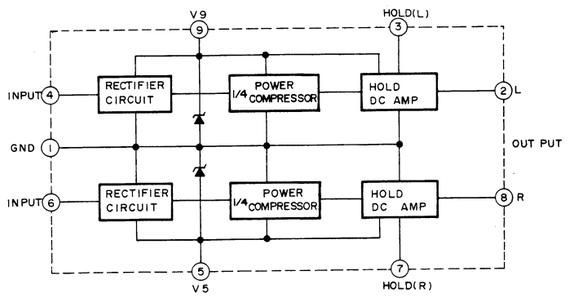

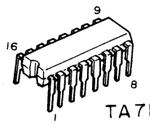

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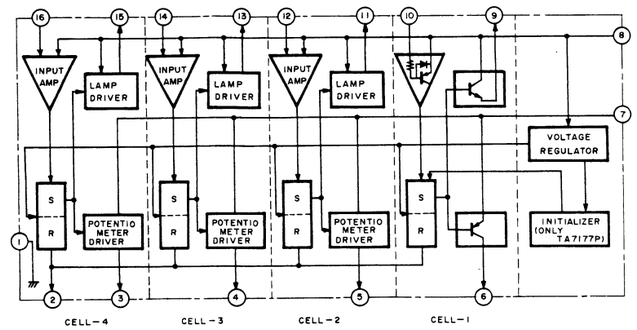

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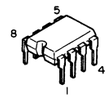
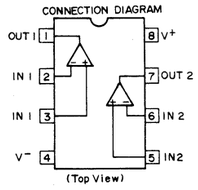
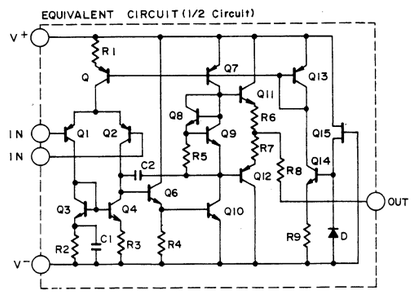
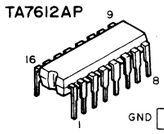






TA7612AP



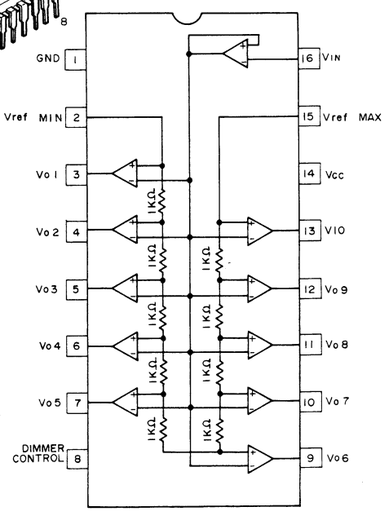


Figure 17

9. ELECTRICAL PARTS LOCATIONS

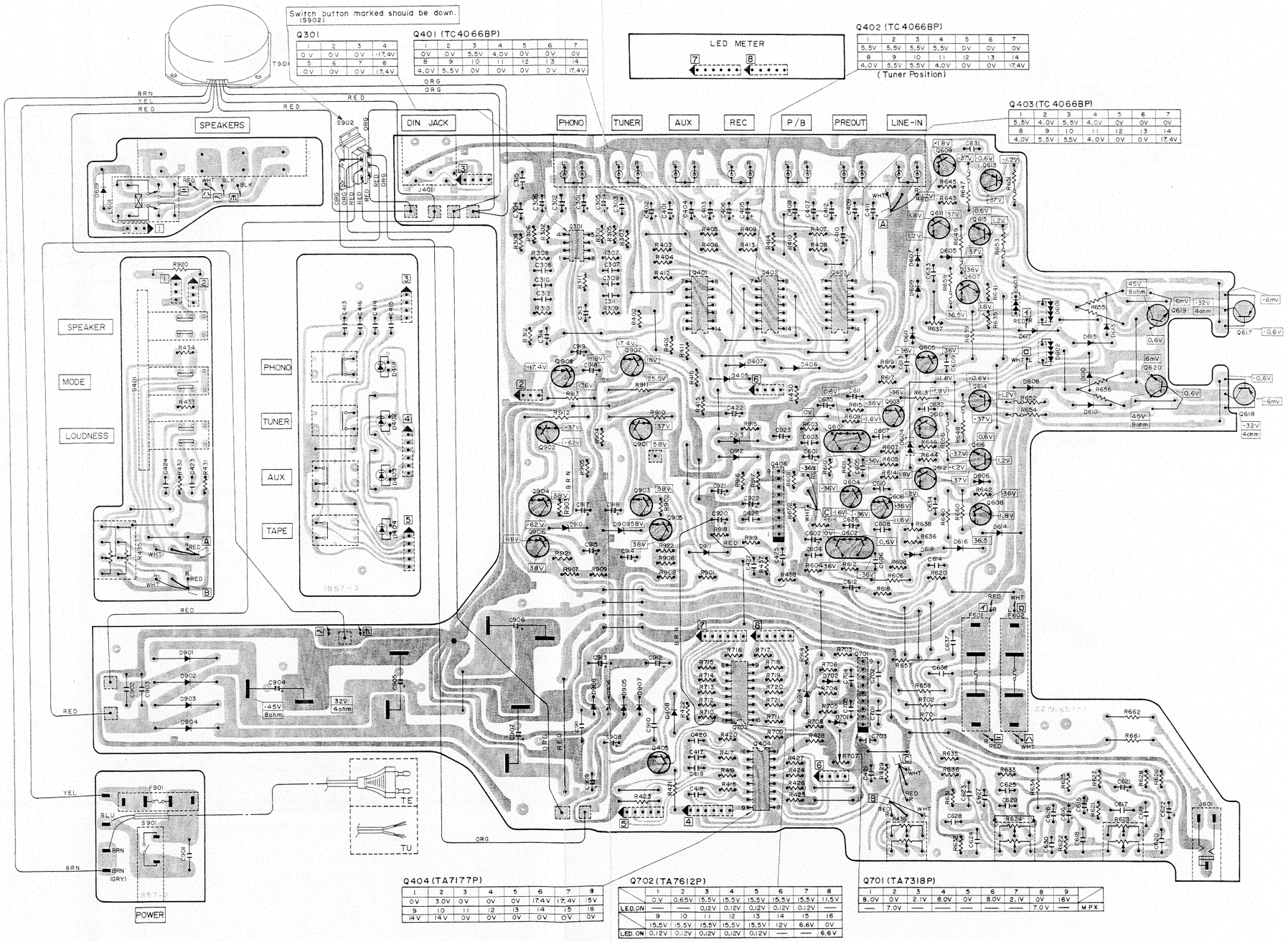
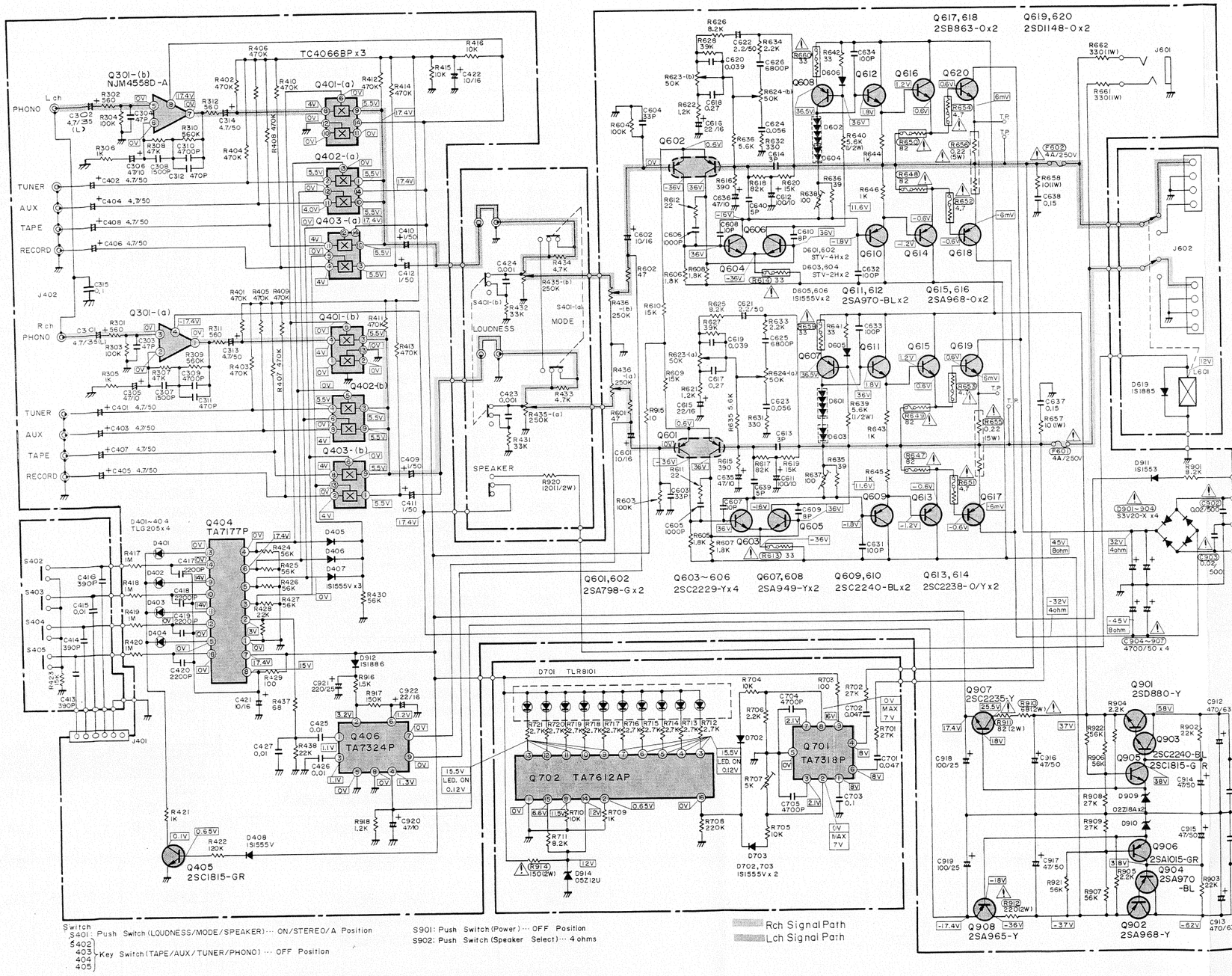
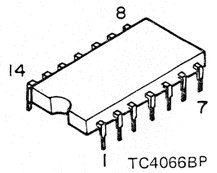
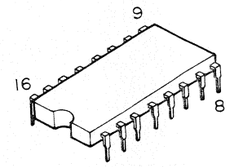


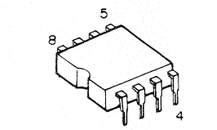
Figure 18

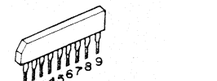
10. SCHEMATIC DIAGRAM

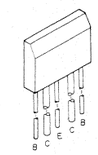


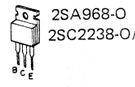












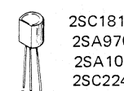
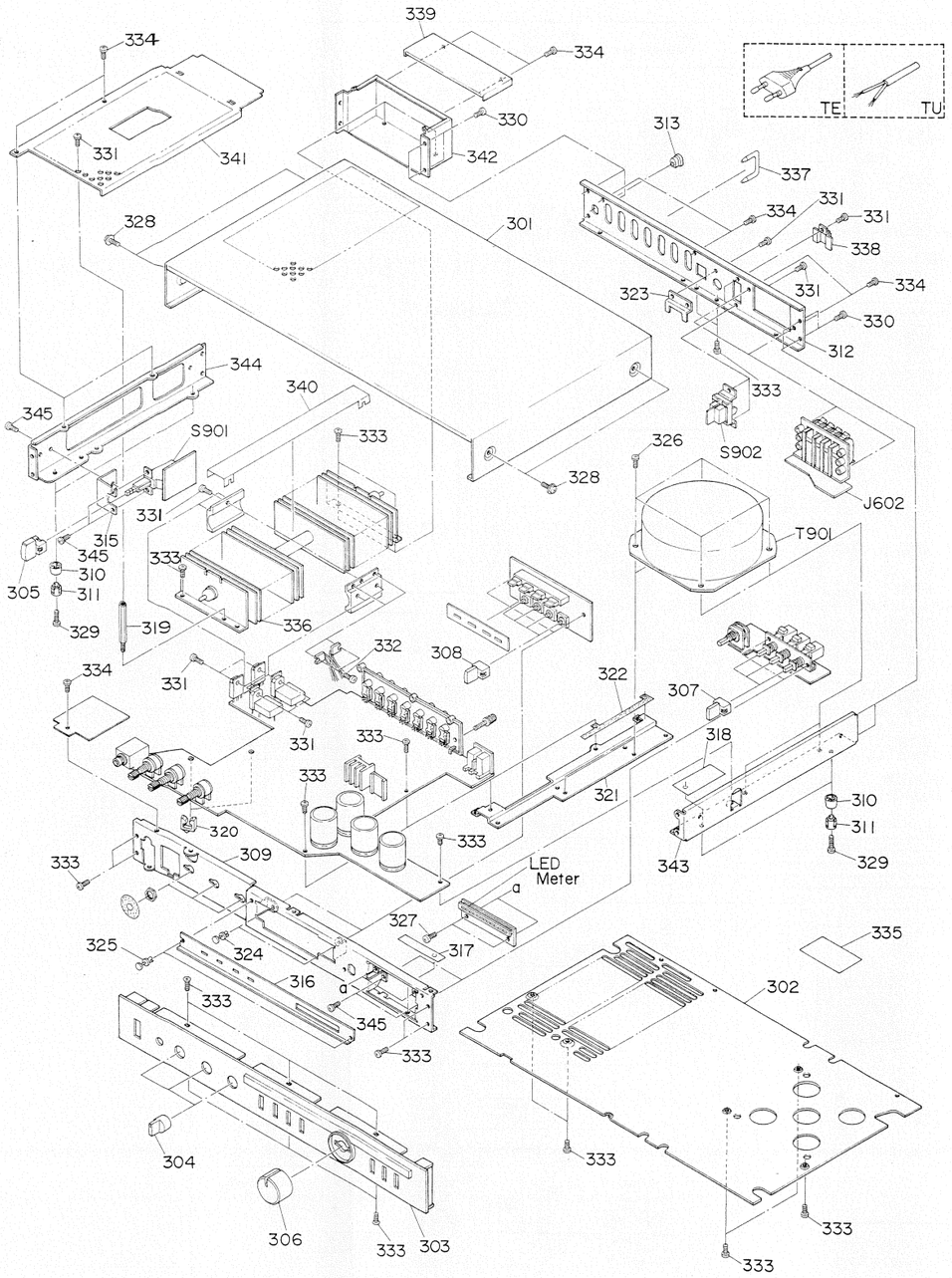


Figure 19

CAUTION:
The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

11. CABINET PARTS LOCATIONS



NOTE: Parts excluded in the Parts List are not available as replacement parts.

Figure 20

12. PARTS LIST

CAUTION:
The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

Symbol No.	Part. No.	Description
		CABINET PARTS
301	20015222	Cover, Top
303	20017160	Panel Ass'y, Front
304	25837494	Knob, Select A
305	22824350	Knob Ass'y, Power
306	22824357	Knob Ass'y, Volume
307	22884013	Knob Ass'y, Push
308	22884062	Knob Ass'y, Key Push
310	22828080	Foot, Outer Side
311	22828081	Foot, Inner Side
312	20015216	Plate, Jack
⚠ 313	25845528	Bush, Nylon
316	20033133	Plate, LED
324	22705020	Rivet, Plastic, 3ϕ x 4.5mm
325	22705021	Rivet, Plastic, 3ϕ x 3.5mm
326	22707040	Screw, FT BID, 4ϕ x 6mm BLK
327	22707367	Screw, DT BID, 2.6ϕ x 8mm
328	22707522	Screw, FL DT, 3ϕ x 6mm CRM
329	22701393	Screw, PAN, Tapping, 3ϕ x 10mm
330	22707066	Screw, BID, 3ϕ x 6mm, BLK
331	22701325	Screw, BID, 3ϕ x 8mm
332	22701452	Screw, BID, 3ϕ x 12mm
333	22701237	Screw, BID, Tapping, 3ϕ x 6mm
334	22701326	Screw, BID, Tapping 3ϕ x 8mm
335	22864388	Label, Name (TE)
335	22864389	Label, Name (TU)
336	20036076	Radiator, Heat Pipe
337	22164842	Plug-2P
345	22707452	Screw, BID, 3ϕ x 5mm
346	22864401	Label, Caution
		TRANSISTORS, ICS AND DIODES
Q301	22114470	IC, NJM4558-A
Q401, 402		IC, TC4066BP
Q403		
Q404		IC, TA7177P
Q405		Transistor, 2SC1815-GR
Q406		IC, TA7324P
Q601,602	22114468	Transistor, 2SA798-G
Q603, 604		Transistor, 2SC2229-Y
Q605, 606		
Q607, 608		Transistor, 2SA949-Y
Q609, 610		Transistor, 2SC2240-BL
Q611, 612		Transistor, 2SA970-BL
Q613, 614		Transistor, 2SC2238-O/Y
Q615, 616		Transistor, 2SA968-O
Q617, 618		Transistor, 2SB863-O
Q619, 620		Transistor, 2SD1148-O
Q701		IC, TA7318P-2
Q702		IC,TA7612AP
Q901		Transistor, 2SD880-Y
Q902		Transistor, 2SA968-Y
Q903		Transistor, 2SC2240-BL
Q904		Transistor,2SA970-BL
Q905		Transistor, 2SC1815-GR
Q906		Transistor, 2SA1015-GR
Q907		Transistor, 2SC2235-Y
Q908		Transistor, 2SA965-Y
D401, 402		Diode, TLG205
D403, 404		
D405, 406		Diode, 1S1555V
D407, 408		
D601, 602	22115664	Diode, STV-4H, Varister
D603, 604	22115665	Diode, STV-2H, Varister
D605, 606		Diode, 1S1555V
D619		Diode, 1S1885
D701		Diode, TLR8101
D702, 703		Diode, 1S1555V
⚠ D901, 902	22115496	Diode, S3V20-X
D903, 904		
D905, 906		Diode, 1S1886
D907, 908		
D909, 910		Diode, 02Z18A
D911		Diode, 1S1553
D912		Diode, 1S1886
D914		Diode, 05Z12U

Symbol No.	Part No.	Description
	ELECTRICAL PARTS	
⚠ T901	22223884	Transformer, Power (TE)
⚠ T901	22223917	Transformer, Power (TU)
S401	22195715	Switch, Push, SPEAKERS/ LOUDNESS/MODE
S402, 403	22195219	Switch, Key TAPE/AUX/- TUNER/PHONO
S404, 405		
⚠ S901	22195631	Switch, Push, Power
S902	22195716	Switch, Push, Speaker Select
J401	22167911	Socket, DIN, 6P
J402	22163810	Jack, 14P
J601	22163676	Jack, Headphone
J602	22162457	Terminal, Speaker
L601	22148670	Relay, DC12V, 3A
⚠ F601, 602	22144365	Fuse, 4A/250V
⚠ F901	22144357	Fuse, 1.25A/250V T
⚠ E1	22176286	Cord, Power (TE)
⚠ E1	22176536	Cord, Power (TU)

CAPACITORS

D = ±0.5 pF, J = ±5%,K = ±10%,M = ±20%, Z = −20 + 80%
ABBREVIATIONS: CD = Ceramic Disk, EL = Electrolytic
MY = Mylar, PP = Polypropylene

C301, 302	22467479	EL, 4.7mfd, 35V, LS
C303, 304	22362470	CD, 47pF, 50V, K
C305, 306	22483470	EL, 47mfd, 10V
C307, 308	22371152	MY, 1500pF, 50V, J
C309, 310	22371472	MY, 4700pF, 50V, J
C311, 312	22321053	PP, 470pF, 50V, J
C313, 314	22488479	EL, 4.7mfd, 50V
C315	22360333	CD, 0.1mfd, 25V
C401, 402	22488479	EL, 4.7mfd, 50V
C403, 404	22488479	EL, 4.7mfd, 50V
C405, 406	22488479	EL, 4.7mfd, 50V
C407, 408	22488479	EL, 4.7mfd, 50V
C409, 410	22488109	EL, 1mfd, 50V
C411, 412	22488109	EL, 1mfd, 50V
C413, 414	22349391	CD, 390pF, 50V, K
C415	22342103	CD, 0.01mfd, 50V, Z
C416	22349391	CD, 390pF, 50V, K
C417, 418	22349222	CD, 2200pF, 50V, K
C419, 420	22349222	CD, 2200pF, 50V, K
C421, 422	22485100	EL, 10mfd, 16V
C423, 424	22371102	MY, 1000pF, 50V, J
C425, 426	22360327	CD, 0.01mfd, 25V
C427	22360327	CD, 0.01mfd, 25V
C601, 602	22485100	EL, 10mfd, 16V
C603, 604	22362330	CD, 33pF, 50V, K
C605, 606	22349102	CD, 1000pF, 50V, K
C607, 608	22361100	CD, 10pF, 50V, D
C609, 610	22361809	CD, 8pF, 50V, D
C611, 612	22483101	EL, 100mfd, 10V
C613, 614	22361309	CD, 3pF, 50V, D
C615, 616	22485220	EL, 22mfd, 16V
C617, 618	22370281	MY, 0.27mfd, 50V, J
C619, 620	22372393	MY, 0.039mfd, 50V, K
C621, 622	22488229	EI, 2.2mfd, 50V
C623, 624	22372563	MY, 0.056mfd, 50V, K
C625, 626	22372682	MY, 6800pF, 50V, K
C631, 632	22362101	CD, 100pF, 50V, K
C633, 634	22362101	CD, 100pF, 50V, K
C635, 636	22483470	EL, 47mfd, 10V
C637, 638	22371154	MY, 0.15mfd, 50V, J
C639, 640	22361509	CD, 5pF, 50V, D
C701, 702	22372473	MY, 0.047mfd, 50V, K
C703	22360333	CD, 0.1mfd, 25V
C704. 705	22372472	MY, 4700pF, 50V, K
⚠ C901	22340150	CD, 4700pF, 400V
⚠ C902, 903	22340032	CD, 0.02mfd, 500V
C904, 905	22440400	EL, 4700mfd, 50V
C906, 907	22440400	EL, 4700mfd, 50V
⚠ C908, 909	22487471	EL, 470mfd, 35V
C910, 911	22340032	CD, 0.022mfd, 500V
C912, 913	22440403	EL, 470mfd, 63V
C914, 915	22488470	EL, 47mfd, 50V
C916, 917	22488470	EL, 47mfd, 50V
C918, 919	22486101	EL, 100mfd, 25V
C920	22483470	EL, 47mfd, 10V
C921	22486221	EL, 220mfd, 25V
C922	22485220	EL, 22mfd, 16V

RESISTORS

All resistors are carbon film ¼W, ±5% unless otherwise noted.

R301, 302	22555561	560 ohm
R303, 304	22555104	100K ohm
R305, 306	22555102	1K ohm

Symbol No.	Part No.	Description
R307, 308	22555473	47K ohm
R309, 310	22555564	570K ohm
R311, 312	22555561	560 ohm
R401, 402	22555474	470K ohm
R403, 404		
R405, 406		
R407, 408		
R409, 410		
R411, 412		
R413, 414	22555474	470K ohm
R415, 416	22555103	10K ohm
R417, 418	22555105	1M ohm
R419, 420	22555105	1M ohm
R421	22555102	1K ohm
R422	22555124	120K ohm
R423	22555153	15K ohm
R424, 425	22555563	56K ohm
R426, 427	22555563	56K ohm
R428	22555223	22K ohm
R429	22555101	100 ohm
R430	22555563	56K ohm
R431, 432	22555333	33K ohm
R433, 434	22555472	4.7K ohm
R435	22651547	250K ohm, B, Variable
R436	22651546	250K ohm, M, Variable
R437	22555680	68 ohm
R438	22555223	22K ohm
R601, 602	22555470	47 ohm
R603, 604	22555104	100K ohm
R605, 606	22555182	1.8K ohm
R607, 608	22555182	1.8K ohm
R609, 610	22555153	15K ohm
R611, 612	22555220	22 ohm
⚠ R613, 614	22500177	33 ohm, Fusible
R615, 616	22555391	390 ohm
R617, 618	22555823	82K ohm
R619, 620	22555153	15K ohm
R621, 622	22555122	1.2K ohm
R623	22651548	50K ohm, C, Variable
R624	22651548	50K ohm, C, Variable
R625, 626	22555822	8.2K ohm
R627, 628	22555393	39K ohm
R631, 632	22555331	330 ohm
R633, 634	22555222	2.2K ohm
R635, 636	22555390	39 ohm
R637, 638	22658576	100 ohm, B, Semi-fixed
R639, 640	22547562	5.6K ohm, ½W
R641, 642	22555330	33 ohm
R643, 644	22555102	1K ohm
R645, 646	22555102	1K ohm
⚠ R647, 648	22500180	82 ohm, Fusible

Symbol No.	Part No.	Description
⚠ R649, 650	22500180	82 ohm, Fusible
⚠ R651, 652	22500169	4.7 ohm, Fusible
⚠ R653, 654	22500169	4.7 ohm, Fusible
⚠ R655, 656	22500258	0.22 ohm, 5W
R657, 658	22570250	10 ohm, 1W
⚠ R659, 660	22500177	33 ohm, Fusible
R661, 662	22570268	330 ohm, 1W
R701, 702	22545273	27K ohm
R703	22555101	100 ohm
R704	22555103	10K ohm
R705	22555103	10K ohm
R706	22555222	2.2K ohm
R707	22658513	5K ohm, B, Semi-fixed
R708	22555224	220K ohm
R709	22555102	1K ohm
R710	22555103	10K ohm
R711	22555822	8.2K ohm
R712, 713	22555272	2.7K ohm
R714, 715		
R716, 717		
R718, 719		
R720, 721		
R901	22555822	8.2K ohm
R902, 903	22555223	22K ohm
R904, 905	22555222	2.2K ohm
R906, 907	22555563	56K ohm
R908, 909	22555273	27K ohm
⚠ R910	22570305	68 ohm, 2W
⚠ R911	22570306	82 ohm, 2W
⚠ R912	22570311	220 ohm, 2W
⚠ R914	22570309	150 ohm, 2W
R915	22555100	10 ohm
R916	22555152	1.5K ohm
R917	22555151	150 ohm
R918	22555122	1.2K ohm
R920	22547121	120 ohm, ½W
R921, 922	22555563	56K ohm

ACCESSORY

	22902890	Owner's Manual